

Claims

What is claimed is:

1. A resource and admission control subsystem in a next generation network,
5 comprising:

an Access Admission Control Function (A-ACF), which is used to receive a
resource reservation request from an application service media flow for the transport
layer of the network, perform authentication and make admission control decision for
the resource reservation request based on user profile, operation policy rules, and
10 transport resource availability, and control an Access Border Gateway Function
(A-BGF) at the border between the access network and the core network in accordance
with the admission control decision result;

an Interconnection Admission Control Function (I-ACF), which is used to
receive a resource reservation request from a cross-operator application service media
15 flow for the transport layer of the network, perform authentication and make admission
control decision for the resource reservation request based on user profile, operation
policy rules, and transport resource availability, and control an Interconnection Border
Gateway Function (I-BGF) at the border between the core networks in accordance with
the admission control decision result;

20 a Gq interface;

a Go interface;

an Id interface; and

a G3 interface;

wherein an application service control function in each NGN application service
25 subsystem interacts with the A-ACF via the Gq interface, to send the resource
reservation requirements of the application service media flow for the transport layer to
the A-ACF through the resource reservation request;

the A-ACF controls the A-BGF at the border between the access network and the
core network via the Go interface, in accordance with the admission control decision

result, to perform the functions of: gate opening or closing, the "gate" indicating packet filtering by IP address/port, packet marking for outbound traffic, bandwidth reservation and allocation for inbound/outbound traffic, IP address and port translation, policing of inbound traffic, packet filtering-based firewall, and measurement of usage, for the media flow;

an interconnection border control function (IBCF) interacts with the I-ACF via the Id interface, to send the resource reservation requirements of the cross-operator application service media flow for the transport layer to the I-ACF through the resource reservation request;

the I-ACF controls the I-BGF at the border between the core networks via the G3 interface, in accordance with the admission control decision result, to perform the functions of gate opening or closing, packet marking for outbound traffic, bandwidth reservation and allocation for inbound/outbound traffic, IP address and port translation, policing of inbound traffic, packet filtering-based firewall, and measurement of usage, for the media flow.

2. The resource and admission control subsystem in a next generation network according to claim 1, further comprising:

a Resource Control Function in access network (A-RCF), which acquires status information including topology and bandwidth of transport resources in the access network, controls QoS-related traffic handling and resource reservation activities of a Traffic Plane Function in access network (A-TPF), maintains a database of transport resource availability and resource allocation status, checks the transport resource availability in accordance with the resource reservation request from the A-ACF, performs checking and resource allocation on the basis of the resource status database, updates the resource allocation status, and returns the check result of transport resource availability;

a Resource Control Function in core network (C-RCF), which acquires status information including topology and bandwidth of transport resources in the core

network, controls QoS-related traffic handling and resource reservation activities of a Traffic Plane Function in core network (C-TPF), maintains a database of transport resource availability and resource allocation status, checks the transport resource availability in accordance with the resource reservation request from the A-ACF or I-ACF, performs checking and resource allocation on the basis of the resource status database, updates the resource allocation status, and returns the check result of transport resource availability;

a G2 interface;

a G1 interface;

an X1 interface; and

an X2 interface;

wherein the C-RCF acquires transport resource status information in the core network via the G2 interface, and controls QoS-related traffic handling and resource reservation activities of the C-TPF;

the A-RCF acquires transport resource status information in the access network via the G1 interface, and controls QoS-related traffic handling and resource reservation activities of the A-TPF;

the A-RCF interacts with the A-ACF via the X1 interface, to receive the transport resource availability check request from the A-ACF and return the check result of transport resource availability in the access network to the A-ACF; and

the C-RCF interacts with the A-ACF via the X2 interface, to receive the transport resource availability check request from the A-ACF and return the check result of transport resource availability in the core network to the A-ACF.

3. The resource and admission control subsystem in a next generation network according to claim 1, further comprising an X3 interface, wherein the C-RCF interacts with the I-ACF via the X3 interface, to receive the transport resource availability check request from the I-ACF and return the check result of transport resource availability in the access network to the I-ACF.

4. The resource and admission control subsystem in a next generation network according to claim 1, further comprising an X4 interface, wherein the I-ACF interacts with a Resource and Admission Control Subsystem (RACS) in any other operator network via the X4 interface, to forward the resource reservation request of cross-operator application service media flows.

5. The resource and admission control subsystem in a next generation network according to claim 1, further comprising an I1 interface, wherein the A-ACF interacts with a Network Attachment Subsystem (NASS) via the I1 interface, to obtain user profiles.

6. The resource and admission control subsystem in a next generation network according to claim 1, wherein

both ACF and RCF are logical functional entities, which are separate physical devices or functional modules integrated in other physical devices.

7. The resource and admission control subsystem in a next generation network according to claim 1, wherein

in each network administrative domain, a centralized RCF or a plurality of RCFs distributed in sub-domains are provided in accordance with the network scale and the type of transport technology;

if a plurality of RCFs distributed in the sub-domains are provided in one administrative domain, the RCFs can interact and coordinate with each other via a universal and extensible protocol interface, so as to accomplish checking of edge-to-edge transport resource availability for the resource reservation request across the entire administrative domain.

8. The resource and admission control subsystem in a next generation

network according to claim 1, wherein

RCFs in different network administrative domains are interconnected via ACFs; if there is a trusting relationship between the different network administrative domains, the RCFs in the different network administrative domains interface to each other, and exchange information with each other.

9• A method for resource and admission control in a next generation network, comprising the steps of:

after receiving a resource reservation request from a Gq interface, performing authentication by an Access Admission Control Function (A-ACF), to check whether the resource reservation request conforms to operation policy rules and whether the resource reservation request conforms to user profiles;

if a Resource Control Function in access network (A-RCF) is provided, forwarding the resource reservation request from the A-ACF to the A-RCF via an X1 interface to check the transport resource availability in the access network, and obtaining the check result of transport resource availability in the access network from the A-RCF; the check result carrying QoS class, bandwidth and ingress path information assigned to an application service media flow;

if the application service media flow is towards a core network and a Resource Control Function in core network (C-RCF) is provided, forwarding the resource reservation request from the A-ACF to the C-RCF via an X2 interface to check the transport resource availability in the core network, and obtaining the check result of transport resource availability in the core network from the C-RCF; the check result carrying QoS class, bandwidth and ingress path information assigned to the application service media flow;

making an admission control decision by the A-ACF in accordance with the check result of operation policy rules, the check result of user profiles, and the check result of transport resource availability, and determining admission control parameters for the application service media flow; the control parameter including gate control,

bandwidth allocation, QoS marking, and ingress path information;

returning the authentication and admission control decision result for the resource reservation request from the A-ACF to an application service control function via a Gq interface;

5 if the admission control decision result is "permit", sending the admission control parameters from the A-ACF to an Access Border Gateway Function (A-BGF) in push or pull mode via a Go interface, to control gate operations, packet marking, and traffic mapping at the A-BGF.

10 10. The method for resource and admission control according to claim 9, wherein the step of performing authentication by an Access Admission Control Function (A-ACF), to check whether the resource reservation request conforms to operation policy rules and whether the resource reservation request conforms to user profiles further comprises the steps of:

15 if the operation policy rules are not stored locally, the A-ACF searches in a remote policy server, to obtain operation policy rules related with the service.

20 11. The method for resource and admission control according to claim 9, wherein the step of performing authentication by an Access Admission Control Function (A-ACF), to check whether the resource reservation request conforms to operation policy rules and whether the resource reservation request conforms to user profiles further comprises the steps of:

25 if the user profiles are not stored locally, the A-ACF interacts with a Network Attachment Subsystem (NASS) via the I1 interface, to obtain user profiles related with the service.

12. The method for resource and admission control according to claim 9, wherein for any cross-operator application service media flow, the method further comprises the following steps:

after receiving a resource reservation request via an Id interface, performing authentication by an I-ACF, to check whether the resource reservation request conforms to a Service Level Agreement (SLA), the operation policy rules, and the transport resource availability of interconnecting link between operators;

5 if the application service media flow is towards the core network and a C-RCF is provided in the core network, forwarding the resource reservation request from the I-ACF to the C-RCF via an X3 interface to check the transport resource availability in the core network, and obtaining the check result of transport resource availability in the core network from the C-RCF; the check result carrying QoS class, bandwidth and
10 ingress path information assigned to the application service media flow;

making an admission control decision by the I-ACF in accordance with the check result of service level agreement, the check result of operation policy rules, and the check result of transport resource availability between operators, and determining the admission control parameters for the cross-operator application service media flow;
15 the control parameter including gate control, bandwidth allocation, QoS class, and ingress path information;

returning the authentication and admission control decision result for the resource reservation request from the I-ACF to an Interconnection Border Control Function (IBCF) via the Id interface;

20 if the admission control decision result is "permit", the I-ACF sending the admission control parameters to an Interconnection Border Gateway Function (I-BGF) in push or pull mode via a G3 interface, to control gate operations, packet marking, and traffic policing at the I-BGF.

25 13. The method for resource and admission control according to claim 9, further comprising the steps of:

during the process of creating the application service session, the application service control function determining the resource reservation requirements of the application service media flow and sending a resource reservation request containing the

resource reservation requirements to the A-ACFs at initiating end and destination end of the media flow via the Gq interface, respectively;

5 during the application service session process, the application service control function sending a resource reservation modification request to the A-ACFs at the initiating end and the destination end of the media flow via the Gq interface as required, to instruct the A-ACFs to modify the original resource reservation and admission control parameters;

10 when the application service session is completed, the application service control function sending a resource release request to the A-ACFs at the initiating side and the destination side of the media flow via the Gq interface, to instruct the A-ACFs to release the original resource reservation and admission control parameters.

15 14. The method for resource and admission control according to claim 13, wherein for any cross-operator application service media flow, the method further comprises the steps of:

during the process of creating a session of the cross-operator application service, the IBCF determining the resource reservation requirements of the cross-operator application service media flow and sending a resource reservation request containing the requirements to the I-ACF via the Id interface;

20 during the session of the cross-operator application service, the IBCF sending a resource reservation modification request to the I-ACF via the Id interface as required, to instruct the I-ACF to modify the original resource reservation and admission control parameters;

25 when the session of the cross-operator application service is completed, the IBCF sending a resource release request to the I-ACF via the Id interface, to instruct the I-ACF to release the original resource reservation and admission control parameters.

15. The resource and admission control subsystem in a next generation

network according to claim 2, further comprising an X3 interface, wherein the C-RCF interacts with the I-ACF via the X3 interface, to receive the transport resource availability check request from the I-ACF and return the check result of transport resource availability in the access network to the I-ACF.

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16. The resource and admission control subsystem in a next generation network according to claim 2, wherein

both ACF and RCF are logical functional entities, which are separate physical devices or functional modules integrated in other physical devices.

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17. The resource and admission control subsystem in a next generation network according to claim 2, wherein

in each network administrative domain, a centralized RCF or a plurality of RCFs distributed in sub-domains are provided in accordance with the network scale and the type of transport technology;

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if a plurality of RCFs distributed in the sub-domains are provided in one administrative domain, the RCFs can interact and coordinate with each other via a universal and extensible protocol interface, so as to accomplish checking of edge-to-edge transport resource availability for the resource reservation request across the entire administrative domain.

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18. The resource and admission control subsystem in a next generation network according to claim 2, wherein

RCFs in different network administrative domains are interconnected via ACFs; if there is a trusting relationship between the different network administrative domains, the RCFs in the different network administrative domains interface to each other, and exchange information with each other.

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19. The method for resource and admission control according to claim 12,

further comprising the steps of:

5 during the process of creating the application service session, the application service control function determining the resource reservation requirements of the application service media flow and sending a resource reservation request containing the resource reservation requirements to the A-ACFs at initiating end and destination end of the media flow via the Gq interface, respectively;

10 during the application service session process, the application service control function sending a resource reservation modification request to the A-ACFs at the initiating end and the destination end of the media flow via the Gq interface as required, to instruct the A-ACFs to modify the original resource reservation and admission control parameters;

15 when the application service session is completed, the application service control function sending a resource release request to the A-ACFs at the initiating side and the destination side of the media flow via the Gq interface, to instruct the A-ACFs to release the original resource reservation and admission control parameters.

20. The method for resource and admission control according to claim 19, wherein for any cross-operator application service media flow, the method further comprises the steps of:

20 during the process of creating a session of the cross-operator application service, the IBCF determining the resource reservation requirements of the cross-operator application service media flow and sending a resource reservation request containing the requirements to the I-ACF via the Id interface;

25 during the session of the cross-operator application service, the IBCF sending a resource reservation modification request to the I-ACF via the Id interface as required, to instruct the I-ACF to modify the original resource reservation and admission control parameters;

when the session of the cross-operator application service is completed, the IBCF sending a resource release request to the I-ACF via the Id interface, to instruct

the I-ACF to release the original resource reservation and admission control parameters.

21. A resource and admission control subsystem in a next generation network, comprising:

an Access Admission Control Function (A-ACF), which is used to receive a resource reservation request from an application service media flow, perform authentication and make admission control decision for the resource reservation request based on user profile, operation policy rules, and transport resource availability, and control an Access Border Gateway Function (A-BGF) between the access network and the core network in accordance with the admission control decision result;

an Interconnection Admission Control Function (I-ACF), which is used to receive a resource reservation request from a cross-operator application service media flow, perform authentication and make admission control decision for the resource reservation request based on user profile, operation policy rules, and transport resource availability, and control an Interconnection Border Gateway Function (I-BGF) between the core networks in accordance with the admission control decision result;

a Gq interface;

a Go interface;

an Id interface; and

a G3 interface;

wherein an application service control function in each NGN application service subsystem interacts with the A-ACF via the Gq interface, to send the resource reservation requirements of the application service media flow to the A-ACF through the resource reservation request;

the A-ACF controls the A-BGF via the Go interface;

an interconnection border control function (IBCF) sends the resource reservation requirements of the cross-operator application service media flow to the I-ACF through the resource reservation request via the Id interface;

the I-ACF controls the I-BGF via the G3 interface.